

In the illustrated embodiment of the invention, the SAN manager 20 drives a GUI to render large SAN topology configurations using a hierarchical, multi-view approach. The hierarchy is based on division of the SAN topology into "segments" which are separated from one another by the elements that make up the interconnect fabric 16, e.g., switches, hubs. The segments are then layered in a structural arrangement that allows the manager 20 to generate a display that hierarchically presents the SAN topology. As used here, a segment refers to portion of the SAN containing multiple components (e.g., hosts 12, storage device 14, SAN manger 20) -- typically, though not necessarily, interconnected -- whether represented as (i) individual components and/or (ii) one or more further segments. At a high hierarchical level, a segment can refer to the entire SAN or even multiple SANs in an enterprise (see, for example, FIGURE 28). At a low level, a segment can refer to an individual component. At intermediate levels, it can refer to segments of the type illustrated in the main panels of FIGURES 29 – 32.

The manager 20, using for example the interface illustrated in FIGURE 15 and/or the NetView interface functionality shown in FIGURE 6, generates a display of the segment layers comprising the SAN topology representation on the operator/administrator console consoles 22a, 22b (or other graphical HMI devices of the type discussed above in connection with FIGURE 2). In the illustrated embodiment, the display contains multiple panels. The main panel depicts a current segment or layer of the hierarchy. One or more navigation panels (each containing one or more icons), e.g., located along the bottom and/or side of the display, permit traversing of the hierarchy.

In the main panel, the manager 20 presents graphical objects (e.g., icons) representing the devices or segments at a current level of the and the elements that make up the interconnect fabric 16 that connect those devices or segments. The manager 20 responds to operator/administrator selection of those icons for selectively presenting lower layers (drilling
 5 down) into the hierarchy, or displaying properties of the selected element. Further understanding of the illustrated embodiment can be realized from the discussion below.

FIGURE 28 depicts a top-level (root) view 162 that comprises a representation of all the SANs 166 known to the SAN manager described above. The view 162 contains one or more graphical
 10 objects (e.g., icons) 164, each representing one of the SANs 166 known to the SAN manager 20. A detailed view of a particular SAN and its components can be displayed by selecting the corresponding graphical object 164 residing in the navigation panel. It will be appreciated that the specific form of the display can be varied depending on operator preferences and needs. Moreover, it will be appreciated that representations other than graphical objects (e.g., text
 15 labels, and so forth) may be used.

FIGURE 29 depicts the detailed SAN view 168 that is displayed upon selection of the corresponding graphical object (FIGURE 28, item 164). The SAN view 168 contains a SAN map 170 (located in the main panel of the display) that is a representation of elements 182, 184,
 20 186 that comprise the SAN and are associated with that level in the hierarchy. The displayed elements are graphical objects that represent two switches 182, 186, and an interconnect element 184 that have corresponding segment maps and an interconnect element map.

Graphical objects 176, 178, 180 (located in the navigation panel of the display) are provided for selecting and displaying detailed views of a particular segment map, or interconnect element map. Alternatively, items 182, 184, and 186 (displayed in the main panel) can be selected directly to display a particular segment map. For example, by selecting the interconnect element graphical object 178, the corresponding map (FIGURE 30 described below) is displayed.

By selecting the various graphical objects, an administrator can traverse the layers of segments that make up the hierarchy. Recovery back to higher levels of the hierarchy can be achieved by selecting the root graphical object 172 or the SAN graphical object 174, which reverts the display to that depicted in FIGURE 28 and FIGURE 29 respectively.

FIGURE 30 depicts the interconnect elements 188 that are displayed as a result of selecting the interconnect element graphical objects (FIGURE 29, item 178 or item 184). The interconnect element map 194 (located in the main panel of the display) contains graphical objects 196, 198 for each of the interconnect elements (switches and hubs) in the SAN. Graphical objects 190, 192 are also provided in the navigation panel for traversing the different levels of the hierarchy. Selecting a graphical object 196, 198 on the map 194 displays the properties of the specified interconnect element.

The illustrated embodiment provides multiple types of segment maps. One is the interconnect element segments (FIGURE 30, discussed above) which are accessed from the SAN map (FIGURE 29, discussed above). These maps contain the interconnect element and the devices directly connected to the interconnect element as well as the connections (FIGURE 31, discussed